

We Claim:

1. A method of applying a fill composition to a contact or via hole having a bottom and sidewalls and formed in a substrate, said composition being useful for protecting the substrate during etching processes, said method comprising the steps of:
5 providing a quantity of a fill composition including a quantity of solid components including a polymer binder and a solvent system for said solid components, said composition being at least about 70% removed from the base material when subjected to a pre-bake thermal stability test, and said composition having less than
10 about 15% shrinkage when subjected to a film shrinkage test; and
applying said composition to at least a portion of said bottom and
sidewalls.

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2. The method of claim 1, wherein said composition is capable of being cross-linked at a cross-linking temperature, and further including the step of heating said composition to its reflow temperature so as to cause at least some of the composition to flow into the contact or via hole, said reflow temperature being less than
20 the cross-linking temperature of said composition.

3. The method of claim 2, wherein said heating step comprises heating said composition to a temperature of less than about 120°C.

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4. The method of claim 2, further including the step of curing said composition by heating the composition to at least about its cross-linking temperature after said reflow heating step.

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5. The method of claim 4, said hole having a depth and wherein the height of the cured fill composition in the contact or via hole is at least about 50% of the depth of the hole.

6. The method of claim 4, said hole having a depth and wherein the meniscus height of the cured fill composition is less than about 10% of the depth of the contact or via hole.

5 7. The method of claim 4, said hole having a diameter and having an upper circumferential edge defining an opening, said substrate presenting a surface adjacent said circumferential edge, wherein said applying step comprises contacting a quantity of said composition with said substrate surface to form a film, said film having a thickness T at a distance from said circumferential edge approximately equal to the
10 diameter of the hole and a thickness t adjacent the edge of the hole, and wherein after said curing step, t is at least about 40% of T .

8. The method of claim 1, wherein said applying step comprises spin coating said composition to the surface of the substrate and to the bottom and sidewalls
15 of the contact or via hole.

9. The method of claim 1, said solvent system having a flash point of greater than about 85°C.

20 10. The method of claim 1, wherein said polymer binder has a molecular weight of less than about 80,000.

11. The method of claim 1, wherein said polymer binder comprises polyacrylate.
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12. The method of claim 1, wherein said solvent system includes a solvent selected from the group consisting of alcohols, ethers, glycol ethers, amides, esters, ketones, and mixtures thereof.

30 13. The method of claim 12, wherein said solvent is PGME.

14. The method of claim 1, wherein said composition further includes a cross-linking agent.

5 15. The method of claim 1, wherein said polymer binder includes a cross-linking moiety.

16. The method of claim 14, wherein the cross-linking temperature of said composition is from about 150-220°C.

10 17. The method of claim 1, wherein said solid components, when mixed together, have a melting point of less than about 200°C.

15 18. The method of claim 1, said composition and said substrate each having respective etch rates, said composition etch rate being approximately equal to said base material etch rate.